Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

E-ISSN: 2320-7078
P-ISSN: 2349-6800
JEZS 2016; 4(6): 718-721

Received: 07-09-2016
Accepted: 08-10-2016

Sobia Khaliq
Bio Control Laboratory, Department of Entomology, Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi, Pakistan

Muhammad Asif Aziz
Bio Control Laboratory, Department of Entomology, Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi, Pakistan

Imran Bodlah
Laboratory of Biosystematics, Department of Entomology, Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi, Pakistan

Ata-ul-Mohsin
Bio Control Laboratory, Department of Entomology, Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi, Pakistan

Munir Ahmad
Bio Control Laboratory, Department of Entomology, Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi, Pakistan

Correspondence
Sobia Khaliq
Bio Control Laboratory, Department of Entomology, Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi, Pakistan

First record of *Brachymeria excarinata* Gahan, 1925 (Hymenoptera: Chalcididae) as hyperparasitoid of *Cotesia plutellae* (Hymenoptera: Braconidae) from Pakistan

Sobia Khaliq, Muhammad Asif Aziz, Imran Bodlah, Ata-ul-Mohsin and Munir Ahmad

Abstract
The parasitoid species, *Brachymeria excarinata* Gahan, 1925 (Hymenoptera: Chalcididae) is recorded for the first time from Rawalpindi and Islamabad, Punjab (Pakistan) as hyper-parasitoid of *Cotesia plutellae*. Main identification characters and measurements of taxonomically important parts supported with micrographs have been given for future identification and its possible utilization in various bio-control programs of different insect pests.

Keywords: *Brachymeria excarinata*, hyperparasitoid, *Cotesia plutellae*, Brassica, Pakistan

Introduction
The family Chalcididae is well-known as economically important family because several members parasitize agricultural insect pests. Chalcididae are endoparasitoids of Lepidoptera and Diptera, a few species attack Hymenoptera, Coleoptera and Neuroptera with about 90 genera and 1530 species globally [1]. Chalcididae are strictly primary parasitoids, but some of them act as partial or full hyperparasitoids. Chalcididae are solitary in nature but few of them are gregarious too [2]. They are heavily armored insects with heavy and compact hind legs also called thunder legs under their hind wings. Their hind femora are greatly swollen which give them heavy look. This distinctive anatomical feature helps them in fast jumping and flying when they are prone to danger. Genus *Brachymeria* Westwood belongs to family Chalcididae with most common and widely distributed species, many of them are primary parasites of different families of various insect orders like Orthoptera, Lepidoptera, Homoptera, Coleoptera, and Diptera. They are also hyperparasitic in a few families of Hymenoptera and Diptera [3]. This genus is worldwide in distribution with 200 species including 42 species from Neotropics in comparison to 71 species from Oriental region [3]. Different numbers of species of this genus has been reported from various parts of the world: 11 species in Brazil [4]; 27 species from North America [5]. 25 species in Vietnam [6]; 3 species from British and Irish fauna [7] etc. As far as neighboring countries of Pakistan are concerned, 16 species from Iran [8]; and 8 species from India were reported [9].
Various new species of this group has been reported from different countries of the world as bio-control agents of various insect pests [10-14]. But as far as Pakistan is concerned, a little work has been done on this genus [15]. First reported *Brachymeria bicolorata* as pupal parasite on *Earis* sp. on cotton in lower Sindh. Later on [16] reported a new *Brachymeria* sp. as pupal parasite of fruit fly in Karachi [17]. Reported few species as parasitoids on insect pest in grain crops in Sindh [18]. Reported two new species of *Brachymeria* acting as pupal parasitoids on spotted bollworms in Karachi [19]. Described two new species of insect pest of grasses in lower Sindh, Pakistan. So there was a need to update the genus *Brachymeria* in Pakistan. For this purpose various surveys were done during 2015–2016 in various areas of Rawalpindi and Islamabad. Here we report *Brachymeria excarinata* for the first time in Pakistan.

Materials and Methods
Diamond back moth larvae and pupae were collected from field area of Rawalpindi and Islamabad from six different cultivars of *Brassica* spp. viz., Chinese cabbage (*Brassica rapa*),

Canola (*Brassica napus* var. *canola),* Cauliflower (*Brassica oleracea* var. *botrytis*), Cabbage (*Brassica oleracea* var. *capitata)*, Broccoli (*Brassica oleracea* var. *italica*), and Pakchoi (*Brassica chinensis* var. *chinensis*).They were brought to the laboratory, and then larvae were reared on Brassica leaves at 25±2 ^{0}C and 65± 2% R.H. under L: D 16:8hcycle. After the emergence of parasitoids and hyperparasitoids, they were collected with the help of mouth aspirator. Some specimens were directly killed in potassium cyanide killing bottle and others were placed in 70% alcohol in glass vials for further studies. Specimens were identified using Nikon microscope (SMS-1500, with 30x 1-11.25x magnification) with the help of keys [3] Measurements of taxonomically important parts were taken with the help of stage and ocular micrometer.

Results and Discussion

***Brachymeria excarinata* Gahan, 1925 (Fig.1a)**

Brachymeria excarinata Gahan, 1925
Brachymeria excarinata Gahan, 1925
Brachymeria apantelesi Risbec, 1956 (synonymised with *B. excarinata* Gahan by Narendran 1989)
Brachymeria excarinata plutellae Joseph, Narendran& Joy, 1972 (as a subspecies of *B. excarinata* Gahan)

Main identification characters

Female

Body black except tegula yellow; femora black with apex yellow (Fig.1g); fore tibia yellow (with a black patch at middle on outer and ventral sides; mid tibia yellow with blackish band medially; hind tibia yellow with sub-basal and apical yellow spots. Head black; wider than longer; a little over its height in anterior view (Fig.1c). Head surface weakly or faintly pitted dorsally, rather irregularly carinate on dorsal part of face; faintly carinate on ventral part of face and gena; smooth at middle of face below scrobe; surface in scrobe polished. Antenna (Fig.1b) very thin scape not exceeding anterior ocellus, as long as segments F1 to F4 combined. Antennal pedicle, F1, F2, F4, F5, F6 and F7 are similar in length. Mesosoma provided with reticulate, rounded, umbilicate and close pits; interspaces of pits narrow and rugose (Fig.1d). Metasoma somewhat pointed posteriorly, sub equal in length to mesosoma; width of mesoscutum a little over two times its length; notaulices distinct; width of scutellum hardly a little less than its length, high in lateral view, gently declined posteriorly, apical margin explanate and rounded off with very sparse pubescence. Fore wing hyaline with veins black, longer than wider (Fig.1e). Hind wing longer than wider (Fig.1f). Hind coxa outer ventral margin with a row of 10–12 teeth and generally a little less than twice as long as wider (Fig.1g).

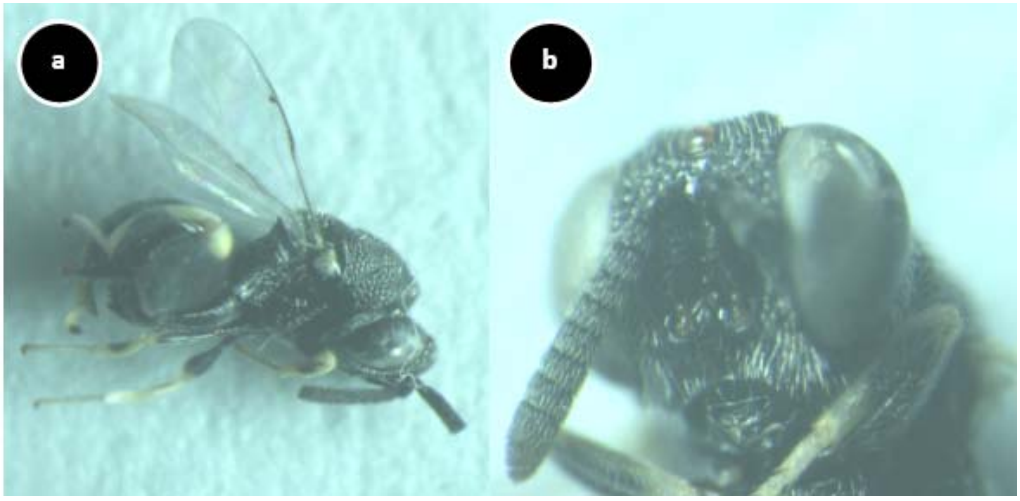
Male. Almost similar to ♀ but antenna stouter.

Body measurements: Female:
Body length: 2.28mm; Head length: 0.312mm; head width: 0.84mm.Dorsal eye length: 0.3mm and width 0.2mm Distance between posterior ocelli, 0.3mm. Distance between eye and posterior ocelli, 0.07mm. Antennal length, 1.0mm.Thorax length: 1.1mm. Abdominal length: 1.032mm.Forwing length: 2mm, width, 0.8mm.Hind wing length, 1.3mm, width 0.3mm.

Material Examined: Rawalpindi, 10-10-15, 15♀ and 8♂; Islamabad, 06-09-2016, 8♀ and 7♂; Rawalpindi, 23-09-16, 6♀ and 3♂; Islamabad, 03-09-2016, 10♀ and 5♂.

World distribution: India, Vietnam, China, Japan, Papua New Guinea and Cameroon [20, 3, 21, 22] and [23, 6]**.**

Remarks: This species is reported for the first time from various areas of Pothwar tract as hyperparasitoid of *P. xylostella*. Specimens emerged after about 4-5 days from the field collection of DBM reared in the laboratory at ambient temperature. Sex ration emerged specimens was female biased as reported for other hymenopterous parasitoids. Already it has been recorded [23] as hyperparasitoid through Lepidoptera, Coleoptera and Hymenoptera. The specimens collected from Pakistan were compared with the published descriptions [21, 6] and found to be similar except the minor size and color variations. This species have been confirmed as closely related with *B. manjerica* Narendran [22]. It has also been reported as parasitic on various families of insects like Pyralidae in Philippines, Yponomeutidae in South India, Eucosmidae, Gelechidae and Tortricidae in Japan. *Brachymeria excarinata* has been reported as a sub species as *Brachymeria excarinata plutellae* Joseph, Narendran & Joy, 1972 but now it has been confirmed as a single species [6].



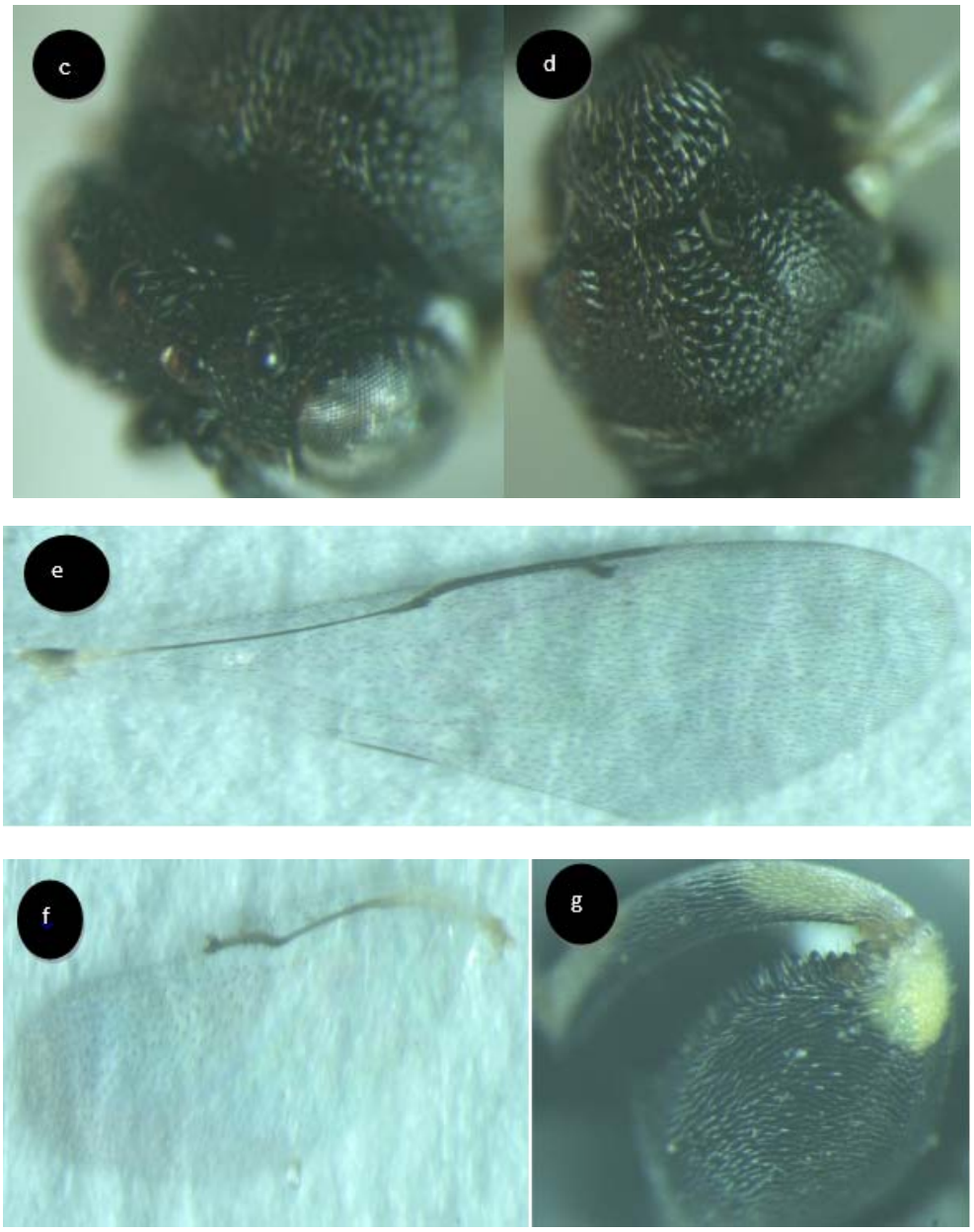


Fig 1: (a) lateral view of adult; (b) frontal view of head showing antennae and eyes (c) Dorsal view of head showing ocelli (d) Dorsal view of mesosoma showing pits (e) Forewing (f) Hind wing (g) Hind femur and tibia

References

1. Gibson GAP. Superfamily Chalcidoidea. In: Hymenoptera of the world: An identification guide to families. Henri Goulet and John T Huber, 1996, 634.
2. Hanson PE, Gauld ID. The Hymenoptera of Costa Rica. University. Press, Oxford, 1995, 893.
3. Joseph K J, Narendran TC, Joy PJ. Oriental *Brachymeria*. A monograph on the Oriental species of *Brachymeria* (Hymenoptera: Chalcididae). University of Calicut, Zoological Monograph. 1973, 1:1-215.
4. De santis L. *Catalago de los himenoptero sbrasileños de la Série Parasiticaincluyendo Bethyloidea.* Federal university of Paraná, Curitiba, 1980, 395.
5. Burks BD. A revision of the genus *Brachymeria* Westwood in America North of Mexico (Hymenoptera: Chalcididae). Trans. Am. Entomological. Society. 1960; 86:238-239.
6. Narendran TC, Achterberg CV. Revision of the family Chalcididae (Hymenoptera, Chalcidoidea) from Vietnam, with the description of 13 new species. Zoological Keys. 2016; 576:1-202.
7. Dale-Skey N, Askew RR, Noyes JS, Livermore L, Broad GR. Checklist of British and Irish Hymenoptera - Chalcidoidea and Mymarommatoidea. Biodiversity Data Journal. 2016; 4:e8013, 1-417.
8. Roodi TT, Fallahzadeh M, Lotfalizadeh H. Fauna of Chalcid wasps (Hymenoptera: Chalcidoidea: Chalcididae) in Hormozgan province, southern Iran. Journal of Insect Biodiversity and Systematics. 2016; 2(1):155-166.
9. Husain T, Agarwal MM. Indian species of *Branchymeria* Westwood (Hymenoptera: Chalcididae). Oriental Insects 1982; 16(4):491-509.
10. Marchiori CH, Pereira LA, Silva Filho OM, Ribeiro LCS, Borges VR. *Brachymeria podagrica* (Fabricius) (Hymenoptera: Chalcididae) as parasitoids of *Sarcodexialambens* (Wiedemann) (Diptera: Sarcophagidae) in Brazil. Arq. Institute of Biology, São

Paulo, 2002; 69(4):121-122.
11. Narendran TC, Khan FR. Two new species of Chalcididae (Hymenoptera: Chalcidoidea) from India. Journal of Threatened Taxa. 2011; 3(2):1506-1513.
12. Zache B, Zaché RRC, Tavares MT, Wilcken CF. *Brachymeria pandora* (Crawford) (Hymenoptera: Chalcididae) as a New Parasitoid of *Thyrinteina leucocerae* (Rindge) (Lepidoptera: Geometridae) in Brazil. Neotropical Entomology 2012; 41:343-344.
13. Tinôco RS, Ribeiro RC, Tavares MT, Vilela EF, Lemos WMDeP, Zanuncio JC. *Brachymeria* spp. (Hymenoptera: Chalcididae) parasitizing pupae of Hersperidae and Nymphalidae (Lepidoptera) pests of Oil palm in the Brazilian Amazonian region. Florida Entomologist. 2012; 95(3):788-789.
14. Prakash G, Sagadai M, Rasappan K. New records of Chalcidid (Hymenoptera: Chalcididae) pupal parasitoids from India. Biodiversity Data Journal. 2016. doi: 10.3897/BDJ.4.e6900.
15. Khokhar KF, Qadri MAH, Ahmed M. Systematics and biology of *Brachymeria bicolorata* new species (Chalcididae: Hymenoptera). A pupal parasite of *Earias* spp. in Sindh, Pakistan. Pakistan Journal of Scientific and. Industrial Research. 1971; 14(3):261-264.
16. Samad K, Khokhar FF, Qadri MAH. A note on the *Brachymeria ocellata* (a new species Chalcididae: Hymenoptera) a pupal parasite of fruit flies in West Pakistan. Journal of Science Karachi. 1971; 1(1):216-218.
17. Ahmed SM, Malik KF, Ahmed M. Three species including two new chalcididae parasites on insect pests of grain crops in lower Sindh, Pakistan. Proc. 5th Pakistan Congress of Zoology 1987, 90-91.
18. Ishrat G, Malik KF. Two new species of pupal parasites of the genus *Brachymeria* Westwood (Chalcididae: Hymenoptera) on spotted bollworms in Karachi, Pakistan. Karachi University Journal of Science. 1987; 14(1-2):75-77.
19. Sheikh MU, Malik FK, Ahmed M. Two new and one known species of the genus *Brachymeria* Westwood on Insect pests of Grasses in Lower Sind, Pakistan. Proc. 5thPakistan Congress of Zoology. 1987, 171-175.
20. Risbec J. Hyménoptères parasites du Cameroun (3e contribution). Bulletin de l'Institut Françaisd' Afrique Noire. 1956; 18:806.
21. Narendran TC, Joseph KJ. New records and new host records of some *Brachymeria* species (Hymenoptera, Chalcididae). Agriculture Research Journal Kerala. 1975; 13(1):70-73.
22. Narendran TC. Oriental Chalcididae (Hymenoptera: Chalcidoidea). Zoological Monograph. Department of Zoology, University of Calicut, Kerala. 1989; 1-441.
23. Noyes JS. Universal Chalcidoidea Database. http://www.nhm.ac.uk/chalcidoids. 2011.